in all districts, the rainfall amounting to almost an inch in southern California and Arizona. The rainfall was also heavy in the Mississippi Valley when the storm was central over Lake Superior.

VII.—Appeared on the Pacific coast on the 21st, attended by general rains on the coast and snow over the plateau regions. This storm continued during the 22d, the rainfall being very heavy, and the southerly gales unusually severe, causing considerable damage to shipping along the northern California and Oregon coasts. On the afternoon of the 22d the storm-centre had passed to the east of the coast line near southern Oregon, when the wind shifted to northerly, attended by snow over Washington as far west as the coast. This disturbance passed over the central plateau region to Colorado, where it was central on the afternoon of the 23d, when it included within its limits the entire region west of the Mississippi, the barometer being 29.20 near the centre. Rain continued on the Pacific coast and rain or snow in the Rocky Mountain regions and the Northwest. On the morning of the 24th a secondary disturbance formed over Iowa, while the principal low area remained central over Colorado. The secondary moved northeastward over the lakes with increasing energy, and was followed by a cold wave in the central valleys, which separated the two depressions, the secondary moving eastward with decreasing pressure at the centre, while the primary remained stationary over Colorado, the pressure increasing at the centre with the advance of the area of high pressure until the 27th, when it moved southward to northern Texas, where it filled up.

VIII.—This storm developed in the southern extremity of the barometric trough which attended the preceding storm. It was first observed as central in northern Georgia on the 25th and moved northeastward, following the coast line, reaching North Carolina on the morning of the 26th and the south New England coast on the afternoon of that date. The westerly winds following this storm were severe over the Gulf and on the south Atlantic coast on the 26th. The storm apparently increased in force as it passed to the east of and along the New England coast during the 27th.

IX.—This disturbance formed in the upper lake region on the 27th and probably resulted as a secondary disturbance forming in the barometric trough which attended the disturbance described as No. VII. When the latter was central over northern Texas a slight depression existed over Michigan, which moved northeastward to the Saint Lawrence Valley, being central near Montreal, Quebec, at the close of the month.

NORTH ATLANTIC STORMS FOR FEBRUARY, 1891 (pressure in inches and millimetres; wind-force by Beaufort scale).

The paths of the storms that appeared over the west part of the north Atlantic Ocean during February, 1891, are shown on Chart I. These paths have been determined from international observations by captains of ocean steamships and sailing vessels received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Storms of marked severity were not reported on the north Atlantic Ocean during the month. Over and near the British Isles high barometric pressure continued during the first and second decades of the month, and after the 20th there were four dates, the 22d, 25th, 26th, and 28th, when the pressure fell below 30.00 (762) in Great Britain and Ireland. The high pressure over the eastern part of the ocean deflected the storms of western origin northward, and until the latter part of the month the centres passed north of the trans-Atlantic steamship routes before reaching the 25th meridian. Over the western part of the ocean storms of moderate strength advanced from the American continent at close intervals.

On the 1st a storm moved eastward over the Canadian Maritime Provinces and the Gulf of Saint Lawrence. On the 2d this storm was central on the northeast edge of the Banks of Newfoundland, with pressure below 29.30 (744) and fresh to strong gales, and by the 3d the storm-centre had advanced over mid-ocean north of the region of observation. On the 1st a storm of considerable strength, which had advanced from Newfoundland, was central over mid-ocean in high latitudes, after which it disappeared in the direction of Iceland. On the morning of the 4th a storm which had moved from the Saint Lawrence Valley was central over the northeast part of the Gulf of Saint Lawrence, with pressure below 29.30 (744), after which it passed northeastward beyond the region of observation. On the 6th a storm was central over mid-ocean in high latitudes. On the 7th and 8th a storm was central south and southeast of Nova Scotia, and by the 9th this storm had moved northeastward over the Banks of Newfoundland, with pressure about 29.40 (747) and fresh to strong gales, after which it moved northeastward and disappeared north of the region of observation after the 10th. On the morning of the 10th a storm was central over Maine, whence it moved northeast of Newfoundland by the 11th, with pressure below 29.20 (742) and fresh gales. By the 12th this storm had moved eastward to the 40th meridian, thence to about the 35th meridian by the 13th, and to the 30th meridian by the 14th, after which it probably recurved westward and united with a storm which had advanced from south of Newfoundland.

On the 16th a storm moved eastward from the Saint Lawrence Valley over the Gulf of Saint Lawrence and on the morning of the 17th it was central northeast of the Grand Banks, whence it moved slowly eastward to about the 35th meridian by the 18th, after which it disappeared north of the region of observation. On the morning of the 17th a storm was central south of Nova Scotia, after which its course cannot be traced. On the morning of the 18th a storm of considerable strength, with pressure below 29.30 (744), was central in the Saint Lawrence Valley, and by the morning of the 19th this storm was central northeast of Newfoundland. Moving slowly eastward the storm-centre reached the 25th meridian by the 22d, after which it apparently recurved northward. During the night of the 18–19th a heavy snow storm prevailed at Saint John's, N. F. On the morning of the 19th the wind veered from south to northwest, blowing hard and driving to sea the ice which had closed the harbor for several days. This was the first storm of the month which advanced to the 25th meridian as far south as the trans-Atlantic steamship routes. On the 21st and 22d a storm moved eastward over the Saint Lawrence Valley and the Gulf of Saint Lawrence, and by the 23d had passed northeast of Newfoundland, with pressure below 29.20 (742). By the 24th the storm-centre had reached the 30th meridian, and on the 25th it was apparently southwest of Ireland, in which region its presence was indicated by reports of the 26th. This was the only storm of the month whose path can be traced over the ocean from coast to coast. On the 23d a northeast gale set in at Bermuda, with rain and high barometer, 30.30 (770). The storm continued until the 25th, with wind veering to east and southeast, and on the night of the 24th went to southwest, and on the 25th changed to west. Lowest barometer, 29.98 (761). On the morning of the 26th low pressure prevailed along the entire Atlantic coast of the United States and Canada, and on the morning of the 27th a storm of considerable strength, with pressure below 29.10 (739), was central over west Nova Scotia, whence it apparently moved rapidly northeastward and disappeared north of the region of observation by the 28th.

FOG IN FEBRUARY.

The limits of fog-belts west of the 40th meridian, as determined from reports of shipmasters, are shown on Chart I by dotted shading. East of the 55th meridian fog was reported

on 3 dates; between the 55th and 65th meridians on 7 dates; and west of the 65th meridian on 2 dates. Compared with the corresponding month of the last 3 years the dates of occurrence of fog near the Grand Banks in February, 1891, numbered 11 less than the average; between the 55th and 65th meridians 1 more than the average; and west of the 65th meridian 4 less than the average. On the dates fog was reported east of the 55th meridian general storms were central in the Gulf of Saint Lawrence. On the dates fog was reported west of the 55th meridian it occurred with the approach or passage to the northward of general storms. Dense fog was reported at points along the New England, New York, and New Jersey coasts on the 1st, 3d, 6th to 9th, 16th to 18th, 20th to 22d, 25th, and 26th, with the approach or passage to the northward of storms whose influence extended off the coast.

OCEAN ICE IN FEBRUARY.

Ice was reported more than 1° north and about 1½° west of the average southern and eastern limits of Arctic ice for February. The southernmost ice was floe ice, in the position given, on the 22d. The easternmost ice reported was a large iceberg, in the position given, on the 5th. In February, 1888 and 1889, no icebergs were reported near Newfoundland and the Grand Banks. In each of the years named field ice was reported over and near the Grand Banks, and in 1889 Gulf ice was encountered south of Newfoundland. On the 5th, 8th, 14th, 15th, 18th, and 22d of the current month Gulf ice was reported between Cape Breton Island and Newfoundland.

The ice reported for February, 1891, was deficient when compared with the average quantity reported for the corresponding month of the last eight years.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for February during the last 9 years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
	° ′	° ′		° ′	° ′
February, 1883	42 01	52 46	February, 1883	46 10	45 44
February, 1884	42 00	50 00	February, 1884	46 50	43 45
February, 1885	41 50	51 12	February, 1885	47 52	42 00
February, 1886	46 10	47 15	February, 1886	48 00	44 47
February, 1887	40 00	48 00	February, 1887	46 26	41 50
February, 1888	44 59	45 08	February, 1888	44 59	45 08
February, 1889	45 35	48 00	February, 1889	45 35	48 00
February, 1890	41 12	50 12	February, 1890	44 30	35 30
February, 1891	44 20	48 00	February, 1891	44 33	44 59
Average	43 07	48 57	Average	46 07	43 31

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

Many of the voluntary stations do not have standard thermometers or shelters.

The distribution of mean temperature over the United States and Canada for February, 1891, is exhibited on Chart II by dotted isotherms. In the table of Signal Service data the monthly mean temperature and the departure from the normal are given for regular stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Signal Service represents the mean of the maximum and minimum temperatures.

The mean temperature was highest over south Florida, where it was above 70, and it was above 60 in south Georgia, and along the east and west Gulf coasts. The mean temperature was lowest in extreme north Minnesota, North Dakota, and northeast Montana, where it was below 0 (zero), and in the British Possessions north of east Montana it was below —10. The mean temperature was 10 or below from Minnesota westward over Montana, in the lower Saint Lawrence valley, in north Ontario, in the north part of the upper lake region, and at elevated stations in central Colorado, and it was below 30 in New England, save in southeast and extreme south parts, and north of a line traced thence south of west to southeast Colorado, thence southward to central New Mexico, thence northwestward to east California in about latitude north 38°, and thence northward over Oregon and Washington.

The mean temperature was above the normal east of a line traced from Lake Superior southwestward to extreme west Texas; to the west of this line the mean temperature was below the normal. The greatest departure above the normal temperature occurred from the lower lake region to the North Carolina coast, where it was more than 5, and the most marked departure below the normal temperature was noted on the northeast slope of the Rocky Mountains, where it exceeded 10. The mean temperature was below the normal at Father Point, Quebec, and at Cape Breton Island.

A severe cold wave swept over the Dakotas and Minnesota on the 2d. On the 8th a severe cold wave extended over south Wyoming, east Colorado, and Nebraska. The mornings of the 9th and 10th were the coldest ever known for the season in southwest Texas, New Mexico, and southwest Colorado. At the following-named stations the temperature was the lowest ever reported for the first decade of February: Montrose, Colo., —12, 16 below; Santa Fé, N. Mex., —6, 3 below; Fort Grant, Ariz., 14, 5 below; El Paso, Tex., 18, 2 below; Fort Stanton, N. Mex., 6, 7 below; San Antonio, Tex., 26, 1 below; and Corpus Christi, Tex., 34, 1 below. The morning of the 10th the temperature was 20 below the normal over the greater part of east Texas. On the 17th the weather was the warmest on record for the season in Maryland, the District of Columbia, the west parts of Virginia and the Carolinas, and in north Georgia. At the following-named stations the maximum temperature was higher than previously reported for the second decade of February: Baltimore, Md., 74, 2 above; Washington City, 74, 1 above; Lynchburgh, Va., 74, 1 above; Raleigh, N. C., 76, 5 above; Chattanooga, Tenn., 76, 2 above; and Atlanta, Ga., 76, 1 above. During the 17th and 18th the temperature was more than 20 above the normal in the districts named, and the morning of the 18th it was 34 above at Washington City. A cold wave extended over the east and west Gulf states on the 26th and 27th. In north Florida the morning of the 27th was one of the coldest on record for the season, the minimum temperature at Jacksonville, 30, being 2 lower than previously recorded for the latter part of February. Extremely cold weather also prevailed in northwest Montana, where the minimum was —34 at Fort Assinniboine, which was 12 lower than any previous record for the season of the year.

The seasonal temperature, January and February, 1891, averaged about as follows: In the middle and south Atlantic and New England states the temperature continued above the normal, and the seasonal departure was 2 to 3. The temperature also continued above the normal in the west Gulf states, the Rio Grande Valley, the Ohio Valley and Tennessee, and the Lake region, the seasonal departure being 4 to 5 in the Ohio Valley and Tennessee and the Lake region. In the extreme northwest, where the mean temperature for January was 20 above the normal, the mean for February was nearly 3 below the normal, and the seasonal departure was about 8 above the normal. The temperature continued above the normal in the upper Mississippi valley, where the seasonal departure was nearly 5. In the Missouri Valley and on the northeast and middle-eastern slopes of the Rocky Mountains the excess